

THE ZOOLOGIST

No. 730.—*April, 1902.*

MIGRATION OF BIRDS IN N.E. LINCOLNSHIRE DURING THE AUTUMN OF 1901.

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THERE have been few seasons during recent years in which the meteorological conditions have been so uniformly favourable for the passage of birds on their southward migration as those prevailing throughout the past autumn, and although for this reason no great "rush" of migration took place, the steady inflow of birds was almost uninterrupted from the middle of August to the end of November.

The whole autumn was unusually fine and dry, the only heavy rainfall occurring on Nov. 12th and 13th.

During the latter half of August light variable winds prevailed, with fine weather. From Aug. 31st to Sept. 3rd the wind was N.E., and from this date to the end of September light easterly to south-easterly winds prevailed with little intermission. Throughout October the wind was again very variable, but usually light, with fine weather. November was a somewhat similar month, except for a gale and heavy rain on the 12th and 13th, followed by a spell of sharp frost to the 18th.

As in 1900, no rare birds appeared, the only unusual occurrences being those of the Firecrest, Roller, Great Snipe, and Red-necked Phalarope.

The waders were again very scarce, as they have been in all recent years. Possibly the great increase in the number of

men with guns who annually visit the Lincolnshire coast from the manufacturing districts is gradually causing the shore-birds to forsake the Humber flats as a resting-place on their autumn passage.

Turdus viscivorus, Linn. Mistle-Thrush.—These birds were extremely numerous in the vicinity of the coast during the autumn. Large flocks appeared on Sept. 21st, and many between the 28th and Oct. 8th. They were again abundant from Nov. 5th to 9th, and on 20th several appeared in the hedges near the sea with Song-Thrushes.

T. musicus, Linn. Song-Thrush. — A heavy and long-continued migration of this species took place, commencing at the unusually early date of Sept. 2nd, when a few birds appeared on the coast. The chief movement, however, took place from Sept. 25th to Oct. 17th. Between Nov. 5th and 9th another passage occurred, accompanying the other species of *Turdidæ*. Lastly, on Nov. 19th and 20th Thrushes were again abundant in all covert near the coast.

T. iliacus, Linn. Redwing.—A very insignificant passage, a few appearing on the coast on Nov. 1st and 5th, and a good many on the 9th. Redwings were less numerous than usual throughout the autumn.

T. pilaris, Linn. Fieldfare.—I saw a small flock of Fieldfares at Well Vale, near Alford, on Oct. 31st, and a single bird on the coast on the following day. On Nov. 5th, 6th, and 9th Fieldfares were very abundant.

T. merula, Linn. Blackbird.—Less numerous on the coast than in any recent year. The first, consisting mostly of young cocks, came in on Oct. 2nd. They were again numerous on 21st. On Nov. 5th there was a considerable flight, the majority being old cocks, with a few young birds of both sexes. Again, on the 9th, a further flight, almost all old males.

T. torquatus, Linn. Ring-Ouzel.—I shot a young bird at North Cotes on Oct. 3rd. One was again seen near the same place on 22nd, and another on 25th.

Saxicola ænanthe (Linn.). Wheatear.—A good many appeared on Aug. 23rd, most of them perching freely on hedges near the sea-bank. On Sept. 4th, 5th, and 6th they were extremely



abundant near the coast, and a few remained until the 23rd. On Oct. 2nd I shot an example of a large form which often appears in October, and on the 3rd and 4th I saw single birds, probably of the same form.

Pratincola rubetra (Linn.). Whinchat.—Very scarce. I only saw three single birds all the autumn, on Sept. 5th, 6th, and 30th.

Ruticilla phœnicurus (Linn.). Redstart.—Many Redstarts appeared in the coast hedges on Sept. 5th, with various other small birds. On the following day they were less numerous, and then entirely disappeared until the 23rd, when a considerable immigration took place. On 25th the Redstarts had left again, and I only saw about half a dozen, and from this date until 30th I saw two or three each day.

Erithacus rubecula (Linn.). Redbreast.—Robins appeared on the coast on Sept. 20th, and were present in varying, though never in great, numbers until the end of the month. There was no visible migration throughout October, but they were again present in small numbers on the 5th, 9th, and 20th of November.

Sylvia cinerea (Bechst.). Whitethroat.—Considerable numbers of Whitethroats appeared in the coast hedges as early as Aug. 23rd. They were again abundant on the 3rd and 5th of September, and still more so on the 14th, but on 20th only a single individual remained. On the 24th I noticed a few in turnip-fields inland at Grainsby and Fenby, and, lastly, two on the coast at North Cotes on the 28th.

S. curruca (Linn.). Lesser Whitethroat.—Only occurred twice on the coast at North Cotes—the first on Sept. 5th, and the second on 28th.

S. atricapilla (Linn.). Blackcap.—I shot a single old cock Blackcap in a hedge at North Cotes on Sept. 28th.

S. hortensis (Bechst.). Garden-Warbler.—Among the many small birds which came in on Sept. 25th were two Garden Warblers, and on the following day I met with a single bird.

Regulus cristatus, K. L. Koch. Goldcrest.—As in last autumn, the Goldcrest was almost entirely absent on the coast. A single bird appeared on Sept. 27th, a second on Oct. 2nd, and a third on Nov. 5th.

R. ignicapillus (Brehm). Firecrest.—I shot an example of this pretty species at North Cotes on Nov. 9th. It was in a tall

old thorn hedge, and I noticed that it kept to the topmost branches instead of to the middle or bottom of the hedge, as a Goldcrest would have done.

Phylloscopus rufus (Bechst.). Chiffchaff. — This usually scarce migrant appeared in somewhat large numbers. I obtained a single bird on Sept. 25th, while on the 27th they were quite numerous in the hedges near the sea-bank at North Cotes. On Sept. 30th I only saw one, and another on Oct. 3rd.

P. trochilus (Linn.). Willow-Warbler. — The passage of this species lasted from the middle of August to the end of September. I first saw it on Aug. 16th, and from that date until Sept. 26th it was always present in the coast hedges in greater or less numbers, though at no time very abundant.

P. sibilatrix (Bechst.). Wood-Warbler. — On Sept. 3rd I saw a Warbler in a hedge at North Cotes which I have no doubt belonged to this species, but it was very shy, and I failed to secure it.

Acrocephalus phragmitis (Bechst.). Sedge-Warbler. — I saw two Sedge-Warblers in a reed-bed close to the sea-bank at Tetney on the somewhat late date of Sept. 26th.

Accentor modularis (Linn.). Hedge-Sparrow. — The passage of the Hedge-Sparrow lasted from the middle of August to nearly the middle of November, but, curiously enough, it was almost absent throughout October. It first appeared on Aug. 16th, and was numerous on 23rd, was again abundant on Sept. 5th and 30th, and, lastly, a slight movement took place on Nov. 5th to 9th.

Parus major, Linn. Great Titmouse. — A few Great Tits appeared in the coast hedges on Sept. 5th and 6th; one each day on Oct. 3rd and 4th; a good many on 22nd, and a single bird on Nov. 29th.

P. britannicus, Sharpe & Dress. Coal-Titmouse. — I saw three of these Tits in a hedge near the sea-bank at Tetney on Sept. 26th, and obtained one of them. On Oct. 3rd I secured a couple in a hedge near the coast at North Cotes. All appeared to belong to the British form.

P. caeruleus, Linn. Blue Titmouse. — Abundant on the coast all through the autumn. The first bird appeared on Aug. 23rd, and it was scarcely ever absent up to the end of November, being particularly numerous on Sept. 21st and Oct. 3rd and 22nd.

Troglodytes parvulus, Koch. Wren. — Not at all numerous, but a few appeared in the coast hedges on Sept. 25th, 28th, and 30th.

Motacilla lugubris, Temm. Pied Wagtail. — A good many young birds in the vicinity of the coast on Aug. 16th. Numerous on Sept. 20th, the majority being young birds. Again abundant on Oct. 2nd, these being mostly adults.

M. melanope, Pall. Grey Wagtail. — I saw the first on Oct. 4th, and several appeared during the first half of November.

M. raii (Bonap.). Yellow Wagtail. — A good many young birds near the coast on Aug. 16th. From Sept. 2nd to 5th a few each day, all immature. Two or three young birds in potatoes at North Cotes on Sept. 23rd.

Anthus pratensis (Linn.). Meadow-Pipit. — This bird was numerous along the coast all through September, though not so abundant as usual. I noticed two coming in over the sea in the daytime on Sept. 27th at Saltfleet.

A. obscurus (Lath.). Rock-Pipit. — A few Rock-Pipits about North Cotes Sluice on Sept. 26th. Numerous all along the coast on Oct. 3rd.

Muscicapa atricapilla, Linn. Pied Flycatcher. — The first Pied Flycatcher appeared on Sept. 4th. They were numerous in the coast hedges on 5th and 6th, a few were seen on the 14th and 23rd, and the last bird was observed on 25th.

M. grisola, Linn. Spotted Flycatcher. — Very abundant at Grainsby on Aug. 29th. On Sept. 4th I noticed two of these birds in hedges near the sea. Last seen at Grainsby on Sept. 23rd. It is somewhat unusual to meet with this Flycatcher on the coast.

Hirundo rustica, Linn. Swallow. — The majority of the Swallows left during the third week of October. The last that I saw were a pair on the 19th.

Coccothraustes vulgaris, Pall. Hawfinch. — Apparently scarcer than usual; I only noticed three in Grainsby Healing covert on Nov. 30th.

Carduelis spinus (Linn.). Siskin. — I shot a Siskin among some reeds near the coast at Tetney on Sept. 23rd, and the same day saw a pair in a hedge near the sea-bank at Marshchapel.

Passer domesticus (Linn.). House-Sparrow. — On Sept. 23rd

very large flocks of Sparrows appeared in the hedges and stubbles near the sea, and on Oct. 21st swarms of these birds were present in the same situations.

P. montanus (Linn.). Tree-Sparrow.—I saw a few Tree-Sparrows in a hedge at Grainsby on Oct. 1st. On Nov. 9th I noticed several among the flocks of House-Sparrows in the vicinity of the coast.

Fringilla cœlebs, Linn. Chaffinch.—Chaffinches were very abundant on the coast on Oct. 21st, and as usual all were cocks.

F. montifringilla, Linn. Brambling.—Bramblings were very scarce all through the autumn. I procured a female on Sept. 23rd on a hedge near the sea-bank at Marshchapel.

Linota cannabina (Linn.). Linnet.—Very large flocks on the coast in hedges, stubbles, and "fitties" on Sept. 20th, and still more abundant on 25th.

L. flavirostris (Linn.). Twite.—Two or three Twites arrived on North Cotes "fitties" on Oct. 3rd. I saw a small flock quite a mile inland on 5th, and a large flock appeared on North Cotes "fitties" on 22nd.

Emberiza citrinella, Linn. Yellowhammer.—Very abundant near the coast in hedges and turnip-fields on Oct. 4th and 5th.

E. schœniclus, Linn. Reed-Bunting.—One or two appeared on the coast on Sept. 30th.

Plectrophenax nivalis (Linn.). Snow-Bunting.—Very scarce; a few young birds and one adult appeared on the sea-bank at North Cotes on Nov. 19th.

Sturnus vulgaris, Linn. Starling.—Large flocks in the vicinity of the coast, and others coming in and passing inland to S.W. on Sept. 20th. On 25th a similar migration, but in larger numbers. On Oct. 2nd and 3rd small straggling flocks were passing inland to N.W. all day. The same passage continued on 4th, but the flocks were larger and not so frequent, and some of them were going south.

Corvus monedula, Linn. Jackdaw.—On Oct. 21st I saw a flock of about twenty Jackdaws come in from the sea, flying from E. to W. at a considerable height.

C. corone, Linn. Carrion-Crow.—About half a dozen Carrion Crows near the coast at North Cotes on Sept. 25th. These birds were unusually abundant during the autumn, exceeding the Grey

Crows in number. On Dec. 1st I saw a flock of quite two hundred in a stubble-field outside Autby Wood—a favourite roosting-place.

C. cornix, Linn. Grey Crow.—A few appeared on Oct. 5th. I noticed a good many inland on the wolds on 15th, mostly flying west.

C. frugilegus, Linn. Rook.—Numerous on grass-land in the vicinity of the coast on Oct. 2nd. On 22nd single Rooks were coming in and going W. at short intervals, until one o'clock; almost all appeared to be old birds. On 25th they were still coming in in straggling flocks from E. to W. until two o'clock, both old and young birds travelling together. On Nov. 29th a similar migration took place, the flocks moving in the same direction until two o'clock. As far as I could see the last consisted entirely of young birds.

Alauda arvensis, Linn. Sky-Lark.—Very little visible migration, but the species was present in its usual numbers during the winter. On Oct. 3rd small parties were going N.W. all day. On the 4th a few flocks going N.W., and a smaller number going S. On 22nd large flocks coming in from the sea from E. to W., and on Dec. 1st a few passing S.W. over Grainsby.

Cypselus apus (Linn.). Swift.—Last Swifts seen on Aug. 23rd. The majority left before the middle of the month.

Dendrocopus major (Linn.). Pied Woodpecker.—Fairly numerous in the winter. I saw the first at Grainsby on Oct. 3rd. One was said to have been killed on the Tetney sea-bank on Nov. 16th, and on 26th I saw two recently killed young birds at a Grimsby birdstuffer's.

Alcedo ispida, Linn. Kingfisher.—First seen on Saltfleet Haven on Sept. 6th; a second at North Cotes sluice on 25th, and several along the sea-bank on Oct. 4th.

Coracias garrulus, Linn. Roller.—In the 'Field' of Oct. 5th Mr. L. D. Marsden notes the appearance of a Roller, which was seen at Brackenborough, near Louth, on Aug. 29th, and again on Sept. 26th.

Cuculus canorus, Linn. Cuckoo.—Fairly numerous at Grainsby during the last week of August. Last seen near Scarthoe on Sept. 9th.

Strix flammea, Linn. White Owl.—A single Barn-Owl in a small plantation near the coast at Tetney on Oct. 9th.

Asio otus (Linn.). Long-eared Owl.—A small Owl, probably of this species, near the coast at Tetney on the evening of Sept. 25th.

A. accipitrinus (Pall.). Short-eared Owl. — I flushed two Short-eared Owls from among the thistles on the sea-bank at Tetney and North Cotes on Nov. 20th.

Buteo vulgaris, Leach. Common Buzzard.—A Buzzard was seen near the sea-bank at North Cotes on Oct. 22nd.

Accipiter nisus (Linn.). Sparrow-Hawk. — A few along the sea-bank on Sept. 5th and 6th. Numerous in the vicinity of the coast at the end of September, and all through the first week of October, and two or three in the coast hedges on Oct. 22nd.

Falco peregrinus, Tunst. Peregrine Falcon.—A large Hawk, probably of this species, on the sands off Grainthorpe Haven on Sept. 27th.

F. aesalon, Tunst. Merlin. — First seen on Oct. 5th; one came in from the sea, and passed inland to W. A second at Somercotes on Nov. 1st.

F. tinnunculus, Linn. Kestrel.—Several Kestrels along the coast on Sept. 5th. Very numerous on 20th and 21st, and again a few on Oct. 22nd.

Sula bassana (Linn.). Gannet.—A single young bird on the sea off Donna Nook on Sept. 27th.

Ardea cinerea, Linn. Heron.—Young birds abundant on the coast on the drains and "fitties" on Aug. 23rd.

Anser brachyrhynchus, Baill. Pink-footed Goose. — First seen on Oct. 15th, a flock of between thirty and forty going W. over Grainsby. It was, however, reported that a flock of one hundred was seen at Tetney Lock on 11th. From this date to the first week of November many flocks of Grey Geese were seen both inland and on the coast.

Cygnus musicus, Bechst. Whooper. — Three large Swans were seen on Oct. 1st on North Cotes "fitties."

Tadorna cornuta (S. G. Gmel.). Sheld-Duck. — A flock of about twenty Sheld-Ducks—all apparently young birds—on North Cotes sands on Sept. 5th, and a few in the same place on 20th.

Anas boscas, Linn. Mallard.—Several large flocks of Wild Ducks appeared on the sea off Saltfleet on Sept. 27th. During

the northerly gale and heavy rain of Nov. 12th and 13th great numbers of Ducks were reported as seen in the Humber and on the coast.

Nettion crecca (Linn.). Teal.—Teal were scarce in the early part of the season, but I saw a flock of a dozen on Aug. 28th. They were rather more numerous during the second half of October.

Mareca penelope (Linn.). Wigeon.—Somewhat scarce and late in appearing. I shot the first on Sept. 25th, but saw very few until October.

Ædemia nigra (Linn.). Scoter.—A flock of about a hundred on the sea off Donna Nook on Sept. 3rd.

Columba palumbus, Linn. Wood-Pigeon.—On Oct. 28th and 29th flocks of forty to fifty going S. at intervals. From Nov. 8th to 15th they were numerous all over the district, but the majority disappeared shortly after the latter date. I was told that an immense flock passed over Thoresby about Nov. 20th.

Turtur communis, Selby. Turtle-Dove.—Was very abundant up to the end of August, but almost all had left by the end of the first week of September.

Crex pratensis, Bechst. Corn-Crake.—Last seen at North Cotes on Sept. 2nd.

Rallus aquaticus, Linn. Water-Rail. — A few on fresh-water "crikes" near the coast on Oct. 21st and 22nd.

Charadrius pluvialis, Linn. Golden Plover.—A few at North Cotes on Sept. 3rd; another small flock on 30th. On Oct. 5th I saw a flock of about fifty come in from the sea, going S.; but the main body did not arrive until Nov. 19th.

Squatarola helvetica (Linn.).—Grey Plover.—Two or three Grey Plovers on North Cotes sands on Sept. 26th, and a few more at Tetney and North Cotes on 28th, but the species was unusually scarce all the autumn.

Vanellus vulgaris, Bechst. Lapwing. — The first travelling flocks seen on Sept. 25th. On 26th small flocks coming in from the sea, and going W., until three o'clock; a few which I shot were young birds. Oct. 3rd, a few flocks going N.W. at a great height. On Nov. 17th, during sharp frost, straggling flocks of Lapwings were passing over Grainsby to W. until about two o'clock, and on 19th they were very abundant on fields near the

coast, with Golden Plovers. Lastly, on Nov. 30th an immense flight passed over Grainsby to W.; it extended as far as I could see in each direction, and must have contained several thousands of birds, but was divided into separate parties of from one to two hundred each.

Hæmatopus ostralegus, Linn. Sea-pie. — A large flock near the mouth of Grainthorpe Haven on Sept. 20th.

Phalaropus hyperboreus (Linn.). Red-necked Phalarope. — One was brought to me by a Plover-catcher on Sept. 3rd, which he had just killed on his decoy-pool near Tetney Lock.

Scolopax rusticula, Linn. Woodcock. — Apparently a poor Woodcock season everywhere. Three were seen at Well, near Alford, on Oct. 30th, and two shot on the following day. The main flight, however, does not appear to have arrived until the third week of November. Two were killed on the Mablethorpe sand-hills on 23rd of that month, and I saw a good many in the coverts about Grainsby on 27th.

Gallinago major (Gmel.). Great Snipe. — On Sept. 6th I shot a Great Snipe from a small patch of potatoes near the sea-bank at North Cotes. When first flushed it only flew about ten yards, and dropped in the same potato-patch.

G. cælestis (Frenz.). Snipe. — Many Snipe on Tetney "fitties," and in "crikes" near the coast on Oct. 2nd and 4th; but very wild for new-comers. On 7th I noticed a few Snipe coming in from the sea, and going W., and I flushed several in potato-fields near the coast.

C. gallinula (Linn.). Jack Snipe. — I shot the first Jack Snipe at Tetney on Sept. 20th, and a second on 26th. A great immigration took place on Oct. 21st, when I killed eight and a half couples of these birds in a patch of reeds known as Madam's Crike, situated close to the sea at Tetney.

Tringa alpina, Linn. Dunlin. — A few on the coast on Aug. 16th, but far less than usual at this season. Some large flocks appeared all along the coast on Sept. 27th. On Nov. 13th, with a heavy N. gale, a flock of two to three hundred Sandpipers, probably of this species, passed over Waith Fen (five miles inland), going W., and flying close to the ground.

T. subarquata (Güld.). Curlew-Sandpiper. — I shot a young bird of this species out of a flock of six on Marshchapel sands on Sept. 20th.

T. canutus, Linn. Knot. — A few small flocks of Knots appeared on North Cotes sands on Sept. 26th, and some very large flocks on Nov. 5th.

Calidris arenaria (Linn.). Sanderling. — Very scarce ; only saw four—two adults and two young—between Saltfleet and Grainthorpe on Sept. 3rd. On 27th I noticed a few small flocks containing both old and young birds in the same locality.

Machetes pugnax (Linn.). Ruff. — Saw a single Ruff on Grainthorpe "fitties" on Sept. 6th.

Totanus hypoleucus (Linn.). Common Sandpiper. — I found these birds abundant in all the marsh-drains near the coast on my arrival in Lincolnshire in the middle of August, and a few remained in the district until Sept. 28th.

T. ochropus (Linn.). Green Sandpiper. — As in the case of the last species, the Green Sandpiper was abundant by the middle of August. It had become scarce by Sept. 22nd, and I last saw it on Nov. 3rd.

T. calidris (Linn.). Redshank. — Very large flocks on Grainthorpe "fitties" on Sept. 3rd.

T. fuscus (Linn.). Spotted Redshank. — I saw two of these birds in a "crike" in a field near the coast at North Cotes on Aug. 16th, and again at the same place on 28th, with a party of five Greenshanks. One was caught by a Plover-catcher at Tetney on Sept. 23rd.

T. canescens (Gmel.). Greenshank. — Several Greenshanks on Tetney "fitties" on Aug. 23rd, and a great many both at Tetney and North Cotes on 28th.

Limosa lapponica (Linn.). Bar-tailed Godwit. — A flock of about a dozen Godwits on Grainthorpe "fitties" on Sept. 3rd.

Numenius arquata (Linn.). Curlew. — Curlews were passing S. over Grainsby in great numbers on the night of Aug. 14th. Some large flocks appeared on the coast on 28th, and the species was abundant through the autumn and winter.

N. phaeopus (Linn.). Whimbrel. — This usually abundant species was almost entirely absent. I saw a few on Aug. 16th, only one on 28th, and all were gone before the middle of September.

Sterna macrura, Naum. Arctic Tern. — Very scarce ; I saw two on Sept. 6th near Grainthorpe Haven. On 27th a few small

flocks of Terns off Donna Nook. Almost all appeared to belong to this species, but possibly there were a few Common Terns among them.

Larus argentatus, Gmel. Herring-Gull. — On Aug. 31st flocks of Herring-Gulls in V-formation were passing S. all day over Grainsby. They were flying at a great height, and calling incessantly. On Sept. 1st they were still passing, but in smaller numbers. On Sept. 3rd I noticed that Herring-Gulls were very scarce on the coast, but the Great Black-backed Gulls were present by thousands, quite nine out of ten being adult birds.

Megalestris catarrhactes (Linn.). Great Skua. — On Sept. 21st I saw a very large dark-coloured Skua off Donna Nook, which probably belonged to this species.

Stercorarius pomatorhinus (Temm.). Pomatorhine Skua. — A beautiful adult bird of this species was shot in a drain near the coast at Tetney by one of the Plover-catchers on Sept. 4th.

S. crepidatus (Gmel.). Arctic Skua. — I saw the first of these birds on Sept. 3rd. On 6th there was an adult of the white-breasted form, and, lastly, a single bird on 27th.

Podiceps fluviatilis (Tunst.). Little Grebe. — First appeared on the coast on Sept. 25th at North Cotes, a single bird in full summer plumage. It was rather numerous during the winter on the brooks and marsh-drains.

AN OBSERVATIONAL DIARY OF THE HABITS—
MOSTLY DOMESTIC—OF THE GREAT CRESTED
GREBE (*PODICIPES CRISTATUS*), AND OF THE
PEEWIT (*VANELLUS VULGARIS*), WITH SOME
GENERAL REMARKS.

BY EDMUND SELOUS.

(Concluded from vol. v. p. 462.)

COMING, now, to my observations on the Peewit (which have, as I suppose, a bearing upon the foregoing remarks), I will premise by saying that anyone who watches these birds during the early spring will see them going through some curious actions on the ground, which I term "rolling," for want of a better word. A bird thus acting presses its breast into the soil, and, by moving from side to side, or turning upon it a little as on a pivot, makes a round cup of just such a nature as—lined with grass or lichen—the eggs, when found, are seen to repose in. Of this fact, and also that many such cups are made by the same bird—who is, in fact, always thus acting—keepers, or some of them, are aware. Whether anybody else is, I do not know, but I have never in any ornithological work, learned or popular, met with any kind of reference to this habit, which may yet, as I believe, throw light upon the origin of nest-building. What is this rolling? What is its essential character and meaning? I can only quote from my notes which were taken at the time, and so, at least, give a minute, and, I trust, accurate description of what I actually saw.

March 8th.—A Peewit rolling, his breast on the ground, his tail up and moving from side to side in a manner suggestive of the generative organs being in activity. But neither this nor the actual roll is so pronounced as I have seen it. Having acted thus for a short while, he rises and runs forward in a series of very short little precise steps, which have a peculiar character about them. His whole pose and attitude is, also, peculiar.

The head and beak are pointed straight forward in one line with the neck, which is stretched straight out to its fullest extent, the crest lying flat down upon it. Evidently he is under the sway of some special feeling, which is, as evidently, of a sexual character. In this strange, set attitude, and with these funny little set, formal steps, he advances without a pause for some twenty or thirty yards, then stops, and, without leaning forward on his breast, elevates the tail, waggles it strongly from side to side with the same peculiar action as before, and then flies off.

Another—or it may be the same—bird is now acting in a similar manner, though there are some points of difference. Although his breast is inclined forward, he does not roll, but, standing thus, keeps constantly moving the tail up and down with the same motion—carrying with it the same suggestion—as before; whilst at intervals he turns on his feet, where he stands, round, or nearly round. These actions are certainly sexual, and seem intended to be more than mere nuptial antics. They suggest—and still more is this the case where the bird rolls on the ground with motions of the anal parts precisely similar to those which may be observed whilst pairing is actually taking place—an attempt (conscious or unconscious) to satisfy sexual desire other than by the ordinary channel.

March 9th.—A Peewit rolling on the warrens between 12.30 and 1 p.m. This bird seems to be quite alone. I cannot, with the glasses, see any others either on the land or flying.

March 14th.—A Peewit rolling. The tail and anal parts are moved—wiggled—in an unmistakable manner, which suggests—and only suggests—the actual act of pairing. Another bird is near during this, but does not seem interested in the rolling one, and the latter soon flies away without paying it any attention. Yet it is to be remarked that the under tail-coverts of the Peewit (just that part exposed during the rolling) are of a rich bright chestnut, which becomes, then, very conspicuous.

March 21st.—Have just watched a Peewit rolling in a very conspicuous manner. It was a full back view, and, as the tail was flung up and twisted from side to side, the rich chestnut under tail-coverts were very conspicuous indeed. The wings were, also, a little quivered, being at the same time drooped and

somewhat extended from the sides. During this display, or whatever it may be called, I noticed another Peewit on the ground, and advancing towards the one rolling, with a very intent look. It soon appeared, however, that the intentness was only in regard to getting food. The bird, though approaching the other (by chance, I now think),* was merely feeding, and, when fairly near, turned deliberately round, and seemed to take no more notice.

March 25th.—A Peewit is now rolling very pronouncedly, and a strange performance it is. The whole body seems lifted up, so that the bird, though sitting, is resting only on his breast, the rest of him being in the air. The breast is thus pressed into the sand, whilst a rolling or side to side movement of it, varying in force, and by no means always apparent, helps to make a cup-shaped hollow. This curious, raised attitude alternates with a more ordinary sitting posture. After each raising of the wings and tail they are depressed, again raised, and so on, whilst at intervals there is the curious waggle of the tail, as before described, suggesting actual copulation. Another Peewit is near, and, whilst this proceeds, comes nearer and nearer, this time, I think, really actuated by an interest in the performance. As it gets closer the other seems to become more excited. The advancing Peewit stops when only a foot or two off, and seems again indifferent, and the rolling one flies right up from his rolling attitude, without even first rising out of it—as far as I can see. He scuds away, and soon begins to sweep and throw in the air. Another Peewit that I now see rolling rises and makes a long and uninterrupted run, with the funny little mincing steps and curious attitudes once before described, right up to the immediate proximity of three Stock-Doves, and, at hardly a yard off one of them, begins to roll again. The Stock-Doves take no notice, as far as can be judged by appearances, and the Peewit, ceasing suddenly with a little start, as though he recognized his error, flies away.

March 29th.—A Peewit rolling. Another appears close amidst the grass, and comes up to it with the funny little step and head held straight out in a line with the body. As it gets up the rolling bird rises and goes a step or two farther off, then,

* Subsequent entries, however, make this conclusion of no value.

again, throwing itself forward, stands almost perpendicularly on the breast, at the same time pecking at and, I think, seizing the bits of grass near, in the beak (this pecking during the process of rolling has become, lately, more marked). The other Peewit now comes right up to the rolling bird, and appears to examine its lower tail-coverts or the parts adjacent. I cannot say certainly whether it actually touches them with the bill, but it appears to do so.* Upon this the rolling one flies off, and the other, falling forward, presses with the breast (I think also pecking), not in exactly the same place, but just near it. Two other birds are now rolling in a most marked and violent manner, within a few yards of each other. When I say "marked and violent," what I mean is this: The breast is pressed upon the grass, the whole body inclining sharply up from it. The wings project like two horns on each side of the tail, which is bent down between them in a nervous, virile manner. All at once a spasm or wave of energy seems to pass through the bird; the tail is bent still more forcibly down—the body and wings remaining as before—and, with some most energetic waggles from side to side, the generative act appears to be performed. It may not be so; it may be something essentially different, but it has exactly that appearance.

In speaking, henceforth, of a bird's rolling, I shall always intend to designate these actions—except, of course, to the extent to which I may qualify them.

April 2nd.—Two Peewits have just paired. I had noticed no prior antics. Having paired, one of them—I am not quick enough with the glasses to say which—runs a little way over the ground, and commences to roll. In a moment or two the other one runs up, looking most interested, and immediately sits along on the exact spot, the first one having now risen and standing aside. The last-come bird now rises also, and both stand looking at the place where they have just rolled, and making little pecks at it with their bills. Subsequently one of them does this beside—but not quite on—the spot. Then the last comer walks a little away, so that I lose sight of it; whilst the other one, on

* I have lately seen something resembling this, but very much more marked and peculiar, in a pair of our small *passeres*—a strange affair of which I made a full note.

which I keep the glasses, rolls again, in the same place (though turned the other way) in the most marked manner. Then, rising, he runs forward in the direction from which he has come, in the curious way before noted, the head lowered to line of back, and beak pointing straight forward.

In a little while the same thing occurs again, but again I am not quick enough with the glasses to be quite certain which bird it is that leads the way in these performances, immediately after the pairing. In each instance, however, I think it was the male. He now rolls in two different places, continuing, after the first time, to run on further in the same direction, before again stopping and rolling. It is only now, on this second occasion, that the other one runs up to him. The actions of the two are then as before, except that the last comer—the female, as I think—rolls this time, slightly, also. It is in a very imperfect and, as one may say, rudimentary manner, but I catch the characteristic, though subdued motion with the tail.

My glass was now upon a Peewit standing negligently on the warrens, when another one, entering its field, flew right down upon it, and either paired, or attempted to do so, without previously alighting on the ground. The time occupied was so short that I should not have supposed more than an attempt had taken place, had not the actions of the two birds immediately afterwards made me conclude that they had paired. They were almost precisely the same as on the first occasion, but I saw them more clearly from the commencement. Immediately after the pairing the male bird made his curious little run forward by the side of the female and a little beyond her, the characteristic features of it being somewhat emphasized.* He then made a short pause, but almost immediately continued straight on—a long run, at the end of which he pitched forward and commenced to roll. The female shortly came up to him in the same manner as on the other occasions, and the male bird now, moving his length forward and sinking down again, she sat in the spot where he had just rolled, pecking, as before described, whilst he rolled again just in front of her. The two birds then rose and stood, looking and pecking in the way that I have before noted. After

* By referring back to p. 134 it will be seen that the actions after (1) rolling, and (2) copulation, which rolling so much resembles, are identical.

a little the hen ran (or walked) away, leaving the cock, who rolled a little more before leaving the place.

In the above notes I have laid more stress upon the peculiar movements which precede and accompany the rolling of the bird than upon the actual rolling itself, by which I have named the whole performance. It must be remembered, however, that I watched it through powerful glasses, by which means all the actions become plainly visible, and take their proper proportion. But to the ordinary casual spectator it is different. He is at some distance; he has only his own eyes, and he is quite uninterested. Under these circumstances it is the general features that alone strike him, or, to speak more correctly, are at last by sheer necessity forced upon his observation. The main features, here, are that the bird sits for some time together with its breast pressed into the sand, augmenting the pressure by various more or less pronounced movements of the body, and that many little cup-shaped depressions, but a small proportion of which ever have eggs laid in them, are to be found about over the warrens and other such Peewit-haunted parts that are open and loose-soiled, during the early spring-time. All the rest—the curious little run forward with its strange, set attitude, the peculiar motions of the tail, everything minute and intricate—is unremarked, even though it be actually seen. As for the actual pairing of the birds, with the curious little drama between them which follows, this must be patiently watched for in the early and often bitterly cold morning—that, at least, is the only time that one can be tolerably sure of its taking place.

In none of the above instances did I walk to examine the places where the birds had rolled, after they had left them. They would, indeed, have been difficult to find; but upon another occasion, when the circumstances made this easy, I did so, and found, as I say, just such a little round basin in the sand as the eggs are laid in. No eggs, however, were ever laid here,* whilst the bird was afterwards to be seen rolling in other parts. It is easy, under such circumstances, to keep one Peewit, or, at least, one pair of them, distinct from others,

* They would, of course, only be laid in one such depression, which would then become the nest proper.

for they appropriate a little territory to themselves, into which they will return and stand, however much they may fly abroad. And here the birds return, in my experience, spring-time after spring-time, so that I judge them to pair for life.

Now I submit that these curious actions of the Peewit during the breeding-time do support that theory of the origin of nest-building which I have here roughly sketched—if not entirely, at least to a certain extent. They point in that direction. Here we have movements on the part of both the sexes, which are obviously of a sexual nature, and, as to which the word “ecstatic” seems hardly to be misapplied. They are most marked (and only or most generally then dualistic) immediately after the actual pairing, and just where this has taken place they commence in the curious little run and set attitude of the male. Out of and as a result of these movements, a depression in the ground greatly resembling, if not quite similar to, that in which the eggs are laid is evolved, and into or about this is shown a tendency to collect sticks, grass, or other loose substances. How different are these collecting movements to those which we see in a bird whose nest-building instinct has become more highly developed! They seem to be but just emerging from the region of blind forces, to be only half purposive, not yet fully guided by a distinct idea of doing something for some definite end. Yet it is just these actions which most resemble ones which seem so purposive in the ordinary building of a nest. All the others seem to me to belong to that large and important group of avine movement which may be called the sexually ecstatic or love-mad group. It may, indeed, be said that, as the Peewit could not have devised a more effective way of producing a cup-shaped hollow in the ground for its eggs than by rolling or pressing upon it as it does, therefore the intention of producing it is to be deduced from the act itself, and we have no right to read any other motive force into it than this. But (besides that this view bows out instinct) the motion by which such hollow is produced cannot at all be separated from that most pronounced, peculiar, and, as it seems to me, purely sexual one of the tail, or, rather, of the anal parts, and there is, moreover, the very marked and peculiar run with the set, rigid attitude (that salient feature of a bird’s nuptial

antics) which immediately precedes the rolling, and which, also, cannot properly be separated from it. All this set of actions must be looked upon as so many parts of one and the same whole thing, and to explain such whole thing we must call in some cause which will equally account for all its parts. The deliberate intention of making a nest will not do this, for many of the actions noted do not in the least further such a plan. On the other hand, sexual excitation may just as well produce rolling on the ground (as indeed it does in some other birds*), and perhaps, even, pecking round about on it, as it may the set, stiff run, and those other peculiar movements. And if some of many movements, the cause of all of which is sexual, should be of such a nature that out of them good might accrue to the species, why should not natural selection seize hold upon, increase, and gradually shape them, making them, at last (through the individual memory), intelligent and purposive, since, by becoming so, their utility might be largely increased, and proceed at a much quicker rate? I believe that in these actions of the Peewit—commencing immediately after the excitation of pairing, with a peculiar run (which, or something similar to which, may be observed in various birds), and going on, without pause or break, to other motions having the same plain sexual stamp upon them, though some may, in their effects, be serviceable—we see this process actually at work, and I believe, also, that in the nest-building of species comparatively advanced in the art we may still see traces of its early sexual or ecstatic origin. I have been, for instance, extremely struck with the movements of a hen Blackbird upon the nest that she was in course of constructing. I have not my notes at hand, but these movements appeared to me to partake largely of an ecstatic—one might almost say a beatific—nature, so that there was a large margin of energy over and above the actual business of building, to be accounted for. I was not in the least expecting to see this, and I can, perhaps, best estimate the extent of the thing by recalling how it surprised and struck me. The wings were half-spread out, and would, I think, have drooped,† had not the edge of the nest supported them, and I particularly

* *Most notably in the Ostrich.*

† The drooping of the half-spread wings is very characteristic of sexual excitement in birds.

noted the spasmodic manner in which the tail was from time to time suddenly bent down. It is true that it then tightly clasped—as one may almost call it—the edge of the nest, pressing hard against it on the outer side. But though such action may now have become part of a shaping process, yet it was impossible for me, when I saw it, not to think of the Peewit, in which something markedly similar could have answered no purpose of this kind. Were the latter bird instead of rolling on the ground to do so in a properly constructed nest of a size suitable to its own bulk, the tail, upon being bent forcibly down in the way I have mentioned, would compress the rim of it just as does that of the Blackbird. And were the Blackbird to go through the motions which I witnessed, on the bare ground and side by side with the Peewit, a curious parallel would, I think, be exhibited. To these two I may add the Rook, and—from recent observation—the Australian or Black Swan. Similarity of the cup of many built nests to the cup-shaped hollow in which so many ground-laying birds deposit their eggs, is, indeed, a significant thing, and the significance is increased when we see the same or very similar movements employed in the shaping of both.

In the case of these Peewits it is true that the pairing, when I saw it, did not take place on the same spot where the rolling afterwards did. Nevertheless, the distance was not great, and it varied considerably. The run which preceded the rolling commenced immediately on the consummation of the nuptial rite, and if this run, which varied in length, were to become shorter and ultimately to be eliminated altogether, the bird would then be pairing, rolling, and, at last, as seems to me highly probable, laying its eggs in one and the same place. That these strange activities should succeed, and not precede, the actual pairing is indeed a curious thing; but I suggest that the rolling of a single bird differs only, in its essential character, from actual pairing, by the fact of its being single, and that, thus, the primary sexual instinct contains, and gives birth to, the secondary nest-making one. At any rate, in the Peewit, movements of a highly curious nature immediately succeed, and seem, thus, to be related to, the act of pairing, and whilst these movements, as a whole, bear a peculiar stamp (expressed by the term "sexual"), some of them, not separable from the *tout ensemble*, suggest, also, the making of a

nest, and, moreover, as said before, something much resembling a Peewit's nest is by such movements actually made. Taking all this together, we have here, as it seems to me, an indication of some such origin of nest-building as that which I have imagined.

As this theory supposes some relation between the nest and the place where pairing takes place—that the one in fact gradually becomes the other—it would be interesting to ascertain whether birds that make their nests in a place which is out of character with their ordinary habits, pair here or amidst their more usual surroundings. For instance, if the Nightjar, a most aërial and arboreal species, were nevertheless to pair habitually upon the ground, this would be a somewhat striking fact. I cannot affirm that it does so. Nevertheless, it is my impression that upon one occasion—which I have recorded in a former paper—I but just missed seeing the pairing of two that I was watching upon the ground and in the near vicinity of the nest. Since then I have seen one pursue another in an obviously amorous or “nuptial” flight from the top of a tree to the ground where it (the pursued bird) settled. The nocturnal habits of this species are, however, a great difficulty in the way of observations of this kind.

The male Wheatear indulges, during the breeding season, in very extraordinary movements of a more or less frenzied nature, and, in watching these, one cannot but be struck by the predilection which seems shown for some natural hollow in the ground, within or over which such movements take place. I have given elsewhere* a full account of these actions as exhibited by two rival birds for the greater part of an afternoon, and I will only quote here a few lines which give that incident of the bits of grass which I have already alluded to. I have, it is true, suggested a symbolical explanation, but, however that may be—nor does, perhaps, the one supposition preclude the other—I think what I witnessed shows that a bird may seize something and bring it to a certain spot whilst in a state of violent nervous excitement, and when the intention of building a nest seems pretty well excluded as a cause of such action.† If this be so, then, at least, some part of the difficulty which we might feel in supposing a process now become so elaborate, and (in some cases

* In my recent work, ‘Bird Watching,’ chapter iv.

† Compare, also, what I have quoted in regard to the Ostrich.

perhaps) intelligent, to have originated in nervous and non-purposive movements, is removed. My note, taken on the spot and at the time of occurrence, is as follows:—

“Instead of fighting, however, which both the champions seem to be chary of, one of them again runs into a hollow—this time a very shallow one—and begins to dance, but in a manner slightly different. He now hardly rises from the ground, over which he seems more to spin in a strange sort of way, than to fly—to buzz, as it were—in a confined area and with a tendency to go round and round. Having done this a little, he runs quickly from the hollow, plucks a few little bits of grass, returns with them into it, drops them there, comes out again, hops about as before, flies up into the air, descends and again dances about.”

Now here a bird brings to a certain spot, not unlike such a one as the nest is usually built in—approaching to it, at any rate—some of the actual material of which that nest is composed, and I ask if, under the circumstances, it can possibly be supposed that such bird really is building its nest when it does so, in the ordinary purpose-implying sense of the term. As well suppose—so it seems to me—that a man, in the pauses of a fierce sword-and-dagger fight with a rival suitor, should set seriously to work house-hunting or furniture-collecting. Such peckings and pluckings seem to me to partake of the general frenzied character of the bird's whole actions. Yet when once the object had been seized, associations might be aroused by it.

Supposing the habit of nest-building to have originated in the way here suggested, it need not surprise us that natural selection, seizing hold of such a prime opportunity, should have entirely altered its original character, so that, now, such pairing on the nest as does take place may be looked upon as a survival of a past state of things. In one particular group of birds—the Bower-Birds of Australia—such survival may have been more than usually pertinacious, and there—on the principle of specialization being always an advantage—the thalamum, or pairing-place, may have become, gradually, quite distinct from the true nest. The habit of building more than one nest* would (as I suggest)

* Common (as I believe) to many birds, and due to the mere force of the instinct. Building, I am convinced, is a pleasure—not a labour—to the bird.

have aided in such differentiation and that the pairing-place should ultimately expand into a "bower" would be a result brought about by the high and gradually increasing æsthetic faculties of the birds constructing it. One can understand, too, that as the thalamum passed into a bower, and as the bower became more and more elaborate and complicated, its original purpose might be gradually obscured, superseded, and more or less lost sight of. Such, indeed, has been the case with our own houses and gardens, which in the manifold wants, tastes, and pleasures that they now minister to, have become something very different to their rude originals—beginning with the mere cave—amongst primitive savages. There has, too, been the process of differentiation as between the bedroom and sitting-room or bower. What was the original cave but a sleeping place?

I believe that the key to the unlocking of many of the wonder-chambers of bird doings is to be sought in the highly nervous and excitable organization which birds, as a class, possess, and, especially, in the extraordinary development of this during the breeding and rearing time. This nervous sexual or parental excitation produces all sorts of extravagant motions and antics which are at first quite useless, but on the raw material of which both natural and sexual selection have seized and are constantly seizing. By these two powers they have been or are being directed into various useful channels, such as nest-building, ruses to decoy enemies from the young, displays of plumage by one sex to the other, and so forth. On this view the fact of many bird (or other) antics not being attributable to sexual selection should not be used (as it has been used) to throw discredit on that hypothesis. By what agency the raw material has been shaped in any one case is a question of the evidence in and relating to such case. And as the exercise of intelligence in all these matters would be an advantage, intelligence, as I believe, has, by the same means, through memory, been gradually worked and woven into them, giving to some or all species a special intelligence in some special directions, which, though much above the general level of its capacity, yet reacts upon this and tends to raise it. I believe, too, that, if closely watched, many actions of birds which seem now to be altogether intelligent and purposive (and, no doubt, are so to a very large extent) will be found to betray traces of a nervous and non-purposive origin.

ON MR. SELOUS' THEORY OF THE ORIGIN OF NESTS.

BY H. E. HOWARD, F.Z.S.

IN his article on the Great Crested Grebe in this Journal (1901, p. 339), Mr. Selous made reference to "one of two rival Wheatears catching up a piece of grass in the midst of violently excited movements," adding that he would recur to the explanation of this habit. I therefore looked forward with much interest to his explanation of a habit which I admit had puzzled me for some years, and which, taking his observations in conjunction with my own, I now feel sure is probably—if we only knew it—to be found amongst the majority of species. I therefore think it best to put my own observations on record, as they appear to me to very much strengthen the foundation on which his theory of the origin of nests is built—a theory which, to my mind, now that I look back upon the same, to me, unintelligible sexual movements which I have from time to time observed, appears to be placed outside the category of a provisional hypothesis.

In an article on the Grasshopper-Warbler (Zool. 1901, p. 61), I described the male of this species picking up a dead leaf, and following the female with it in his bill, while mating. But this only very tamely describes what really happens, and if it had not been for Mr. Selous I should still have been satisfied with the conclusion I then arrived at, *viz.* that it was an outward sign of the one absorbing picture in the bird's mind—the construction of its nest. Sexual frenzy precisely describes the condition of the males of the above species at this time—that is to say, during the week or so they are mating—and in every case where I have closely followed their movements at this period, they have performed the same curious ceremony, usually in the midst of intensely excited and nervous actions. These movements are characterized, as a rule, in the following way: The male walks—you might almost say struts—along in front of the female,

picks up a leaf, again walks on for a little, drops it, and disappears with quick darting flight after another—probably rival—male. Presently he returns, crawls to the top of a bush, commences to sing, in the middle suddenly breaks off, and again darts off after the other male, then returns and marches on in front of the female, and again picks up and carries a leaf. She meanwhile threads her way in and out of the dead and growing herbage, apparently unconscious to anything that might in any way tend to produce the same nervous tension in her own mind, and oblivious to the sexual selection proceeding around her. In fact, I cannot call to mind a single case where I have seen anything approaching frenzy in the female of any species while mating.

The conclusion I formed after remarking the behaviour of the males at this season was that the picking up and carrying of a leaf was due solely to the fact that, inasmuch as the construction of the nest must be commenced within a few days of the time of my observations, and the bird's mind being full also of this same idea, this action might be *ipso facto* a commencement; but, in the light of later observations, any theory of this kind falls to the ground. The following spring I was attracted by the movements of a Blackcap flying from tree to tree in hurried flight, carrying a piece of one of the dead grasses with which the nest is generally constructed. But herein lies the difference—that it was one of the first Blackcaps that had arrived, and there was no sign of any female; in fact, the females had not arrived. Again, last year, the first Whitethroat arrived in this district—and how well I remember the day—on the 20th April, the first day of that long spell of dry weather. The sun was just rising, and the rays of light coming through a slight mist gave all the trees and foliage that extraordinary glow which those who are accustomed to being out at that time of day will readily understand. Not having seen the bird for six or seven months, I thought I must sit down and watch. The bird was in that state of restless frenzy, at one moment diving into a bramble-bush, then climbing up the topmost sprays, singing all the while intermittently. After one rather longer dive into the bush than usual, he reappeared, carrying a piece of dead grass in his bill, full of excitement, flying from spray to spray, with no apparent object.

for so doing. Again, as in the case of the Blackcap, no female was present, the females, as we all know, arriving late.

One more case—this time a Hedge-Sparrow. The male was hopping along a wall in front of the female, carrying a piece of straw, excited, as far as Hedge-Sparrows can be, shuffling his wings and flirting his tail. But, as Mr. Selous aptly remarks, it is the beginning of everything that is fraught with such significance. Is this a non-purposive movement springing out of sexual passion, or is it an outward representation of an idea contained in the bird's mind?

It appears to me that the fact of the male Blackcap and Whitethroat going through this performance before any females had arrived tends to prove that it belongs to the former hypothesis rather than to the latter, and thereby upholds Mr. Selous' theory that this was the origin of the nest. For, watch a Blackcap on his arrival, or any other male before actually having mated, and you will see that his or their movements point to the fact that all the thoughts are concentrated on the one object—the possession of a female—and to attain this object all their powers, chiefly vocal, are directed. Any thought of the construction of a nest—if really there is at all at this period, which I am inclined to doubt—must be in comparison with the other momentous event in the bird's life wholly insignificant. At no time are the vocal powers of the Blackcap shown to such an advantage as when mating; his song then is continuous. When not loud it is a low expressive warbling, and if you will watch him you will see that his whole body is trembling with this nervous excitement. At this time also he puts himself in all kinds of curious contortions. I have seen him carry his tail more than at right angles to his body, which he does at no other period of his life. The same thing may also be said of the Whitethroat, only, in his case, warbling would hardly express his nervous vocal production—it is more of an angry scolding.

Again, the Chiffchaff only floats about the air like a big moth when trying to win a mate. Much the same might be said about the Garden Warbler.

The Marsh-Warbler produces far more vocal variations at this time. The Red-backed Shrike never mimics to such perfection as when mating. I have heard in succession Swallow,

Partridge, and Starling most perfectly imitated. And at what other time does he go through those extraordinary, what one might call, gestures to the female; he does all he can to speak? At times, when he twists his neck round and turns his head upward, he appears to be imploring heaven to help him.

I could mention many similar cases, but these, I think, are sufficient to prove that the whole powers of the bird's body and mind are concentrated solely on the possession of a female. This being so, it appears to me to be highly improbable that this action can in any way refer directly to the construction of the nest.

For a minute let us consider it simply expressive in practical form of a mind overburdened with the mental image of a nest and all that pertains to its construction, and that it is in no way associated with any sexual passion. Assuming this, then, why do we not find the same action in the female? Assuredly to her the nest must mean as much, if not more, than to the male; and if this was only an expression of delight on the part of the male at the return of the breeding season, it is only reasonable to suppose that we should find the same or some similar action in the female. But the fact is clear to my mind that in no case have I found any similar action in the female. I admit my observations are few, and can in no way be thought of as anything in the nature of proof; but, taken in conjunction with Mr. Selous' own observations, I think it will be admitted there is reasonable basis upon which his theory is raised.

NOTES AND QUERIES.

AVES.

Notes on the White-breasted Kingfisher (*Halcyon smyrnensis*.— In 'The Zoologist' for 1901 (p. 451), Mr. E. L. Gill notices the slow sailing flight of certain birds, not normally singing on the wing, when they occasionally do this. I have observed a similar peculiarity in the White-breasted Kingfisher here (Calcutta). This bird occasionally flies about slowly and aimlessly high in the air, uttering a peculiar wailing cry, very different from its usual harsh cackle; though this, too, is given either on the wing, or just before starting on an ordinary flight. I should like also to draw attention to two other peculiarities of this bird. One is, that it occasionally practises piracy. An individual which haunts the Museum pond, whereon there are some Dabchicks, has several times been seen by me to attempt to rob one of these birds of a fish which it had captured, and once, at all events, with success. On one occasion I saw the Kingfisher hovering over something in the water, which turned out to be a Dabchick washing itself; evidently he had for a moment mistaken the actions of his victim, and thought it had caught something. The other point is, that although this Kingfisher is as big as a Thrush, with plumage of brilliant blue, bay, and white, and with a scarlet beak, it is not at all conspicuous when seen across the Museum tank (about sixty yards wide), whether it sits on a bamboo, or on a dark-foliaged tree; indeed, if one's eyes are taken off it, the bird is very hard to find again. Yet in flight, at the same distance, it is a most striking object. This shows that a plumage which appears most glaringly conspicuous close at hand does not necessarily render its wearer easy to see some distance off, if the colours are suitable for blending with the normal environment of the species. If the bird were all bay or white instead of partly blue, it would catch the eye at once. — F. FINN (Indian Museum, Calcutta).

A Little-known Action of the Kingfisher.—While recently fishing on the Bela, my son saw a Kingfisher (*Alcedo ispida*) splashing about on the top of the water in rather a deep pool. Thinking the bird

was in difficulties, he ran forward to rescue it, if possible; but when he got to the place he saw that there were two birds in the act of treading, the hen being scarcely visible till both rose from the water and flew off. Hitherto I have been under the impression that Kingfishers only entered the water after their prey, leaving it again as soon as they had secured it. I may mention that the river-watcher, who is well versed in the habits of birds, and has been about rivers all his life, has never met with a similar instance.—R. H. RAMSBOTHAM (The Hall, Meole Brace, Shrewsbury).

Golden Eagle in Co. Donegal.—On the 17th or 18th of March I had the pleasure of seeing a fine Golden Eagle (*Aquila chrysaetus*) at the establishment of Messrs. Sheals, the taxidermists here, where it had been sent for preservation; it had been caught in a vermin-trap by one of the keepers on Sir James Musgrave's estate in Co. Donegal. Sir James tells me that they protect them as much as possible, although they destroy many Grouse, Hares, and young Lambs. Some time ago he sent a fine specimen to the gardens of the Royal Zoological Society, Dublin, where it was much appreciated, and where, I understand, there were either none or a very poor representative of this species at the time. He also tells me that they breed every year in the mountains round his shooting; he does not grudge them their share of the game, and I sincerely wish every game-preserver throughout the British Isles would look on the few birds of prey left to us in this light.—W. H. WORKMAN (Lismore, Windsor, Belfast).

I have also examined the Golden Eagle referred to above. It is a male in splendid plumage, weighing $8\frac{3}{4}$ lb., and measures $6\frac{1}{2}$ ft. from tip of wings.—W. C. WRIGHT (Charlevoix, Marlborough Park, Belfast).

Allen's Gallinule near Yarmouth.—I learn from the Duchess of Bedford that a pair of *Porphyriola alleni* were certainly turned out with other birds at Woburn Abbey, but this took place in 1889, and it seems quite impossible that either of this pair can be the example captured on a boat off Yarmouth on Jan. 1st, 1902 (*cf. ante*, p. 98). Even if they had survived so long, they would by that time have been in the adult plumage, which is purple, whereas the Yarmouth specimen is immature.—J. H. GURNEY (Keswick, Norwich).

PISCES.

A Question of Coloration.—On Feb. 8th last, Mr. Alma Nichols, the noted Stalham angler, kindly invited me to go and look at some fish—

several Roach, a couple of Dace, a Gudgeon, and a small Pike—which he had kept for nearly three weeks in a foot-bath standing under the drip of a pump in his back yard. All the wells hereabouts are very shallow, and so, susceptible to the influence of surface-water, which may account for the longevity of these fish in pump-water. But the most curious thing connected with them was this—when they were first put into the bath (an unpainted galvanized one), they were all dark and brightly coloured; in about a week they began to lose colour, and so became much less conspicuous. Here was a supposed case of fish assimilating themselves in tint to their surroundings—an instance of the assumption of protective coloration; for now, as seen from above, they were far less conspicuous than when first put into the whitey-grey zinc bath. I suggested that their loss of colour was due to loss of health caused by the pump-water. A few days later, one of the Roach became blind, and soon afterwards returned to its darker normal colour. It subsequently died. On Feb. 12th I made another inspection, and found a second Roach partly blinded by a black fungoid growth on the eyes, and it also was in process of turning back to its former dark hue. The question arises, does light and exposure, *acting through the eyes only*, tend to bring about a change of colour in fish?—M. C. H. BIRD (Brimstead Rectory, Stalham).

MOLLUSCA.

Duration of Life in *Helix pomatia*.—A few Edible Snails (*Helix pomatia*) have been living here at large for at least seventeen years. The first batch were brought from Normandy, and turned down in the year 1882. Another lot from Surrey was added to the colony in 1884, since which time no more have been introduced. They do not appear to have bred, or, at any rate, I have seen no young ones, with the exception of two broods reared in a greenhouse, and afterwards turned out, and these soon disappeared, perhaps eaten by Thrushes, and Hedgehogs. Yet a few adults have since appeared almost every summer, with a few exceptions, up to the last (1901), when two were seen. They, or at least two or three of them, always keep to the same spot, only a few yards square, and rarely wander any further from their home. I believe that the two or three Snails just mentioned hibernate under a heap of sticks, for it is close to this that they make their appearance in summer. One venerable-looking Snail, easily recognized by its bleached, weather-worn, and damaged shell, is very regular in its annual appearance abroad. I have not seen any of them moving about earlier in the year than May, or later than the

second week in August. If these are the very same individuals brought here in 1882 or 1884, they cannot at the present time be less than eighteen years old, and may be a good deal older, for they were all full-grown, or very nearly so, when first brought here. *H. pomatia* is not, as far as I am aware, indigenous to any part of Suffolk, even on the chalk, and the soil here is by no means of a calcareous nature, but consists of sharp flinty gravel and sand. When full-grown the shell of this species is so thick and strong as to be proof against the hammering process resorted to by the Thrush, and I doubt whether the jaws of the Hedgehog would be able to crack it. Except among insects, it seems to have few enemies. From its large size, *H. pomatia* is well suited to the vivarium, for its ways and doings are so much more easily and conveniently observed than is the case with smaller species. The laying and hatching of the eggs, growth of the young, and the elaborate preparation for the winter made by this Snail by burying itself just beneath the surface of the soil, and constructing a sort of temporary operculum, are all interesting processes to watch.—G. T. ROPE (Blaxhall, Suffolk).

ARACHNIDA.

Collecting in Australia. — Perhaps the most numerous group of Australian Spiders are the Epeiræ. But, though there are undoubtedly very many species, it is still my opinion that the number tabulated by Herr Koch in his work on Australian Spiders might be greatly reduced. Of course, it is foolish to censure one so immeasurably more conversant in the subject, but I think I am right in saying that specimens which have been bottled some months, and which have travelled all the way to Germany, are rather likely to mislead the describer, and tend to the enumeration of too many species. What is wanted out here is some collector thoroughly acquainted with the subject, who will be able to spend all his time in the study, and so achieve better results. Of course, some good work is being done by the authorities of the Australian Museum, and also by some few private individuals; but these, as a rule, are not able adequately to publish the results of their work. If some institution, such as the South Kensington Museum, or other, were to send a collector to spend some years in Australia, I think it would be found that there is still more to be done than has ever yet been anticipated. Practically speaking, there are no real workers in Australia, and consequently the subject is rather neglected. It is not only to investigate

these matters, but to publish the results, that is necessary. I am sure that any such collector would receive co-operation wherever anyone here could give it, and, if supplied with sufficient funds, would do some really useful work. The Spiders of Australia have scarcely been collected at all, and collections from Cape York and the wild parts of Central Australia could not fail to bring to light many undescribed species and genera.

I can only add that I hope this suggestion will be followed up, and that someone will see fit to follow Herr Koch's lead ; only let him come here and describe from life, instead of from old and faded specimens.—S. H. BURTON BRADLEY (60, Margaret Street, Sydney).

NOTICES OF NEW BOOKS.

The Birds of North and Middle America. By ROBERT RIDGWAY.
Part I. Fam. *Fringillidæ*. Washington: Government
Printing Office.

THIS is the first volume of what will be a very large work, and there is little doubt that it will be completed; for American enterprise is to-day beyond any other in zoology, thanks to a fostering government. The faunistic area dealt with is from the Arctic Lands to the Isthmus of Panama, the West Indies, and other Islands of the Caribbean Sea,* and the Galapagos Archipelago. This publication will be considered a fragment in the years to come, when the "Birds of America" will be written—from the Arctic Lands to Patagonia, for that must be the America of the future, if political destinies ever cast a preliminary shadow.

Mr. Ridgway defines ornithology as comprising two distinct studies—*systematic* or *scientific*, and *popular*. The scientific is stated to deal with the structure and classification of birds, their synonymies, and technical descriptions. The "popular" is estimated as treating "of their habits, songs, nesting, and other facts pertaining to their life-histories." Believing science, as long since taught, to be "organized common sense," we should prefer to call both these phases of study scientific ornithology—the one technical, the other bionomical. The systematic problem has been abundantly considered by Mr. Ridgway, and much is advanced that is new. In the *Fringillidæ*, Dr. Sharpe's *Coccothraustinæ*, *Fringillinæ*, and *Emberizinae* are estimated as "so-called subfamilies" and "unnatural groups." From such questions, which must be left to the ultimate decision of the higher criticism, we may at least glance at some others. It is to be regretted that the author recognizes "trinomials" as a "necessary evil," and, as a logical sequence, the Cardinal Grosbeak is referred to as

* Except Trinidad and Tobago.

"*Cardinalis cardinalis cardinalis*." In other points most ornithologists will cordially agree, especially in the remark that "the correction of an author's orthographical errors is a pernicious practice, though much in vogue; 'science is not literature,' neither has it any concern with what an author should have done or meant to do, but only with what he actually did."

The synonymic references to the species are very ample, and have been compiled with much care. The book is essentially a publication that cannot be neglected, and must be consulted by all who study this avian fauna.

Bulletin of the United States Fish Commission. Vol. xix.
Washington: Government Printing Office.

THIS, the last volume received, maintains its scientific value and excellence in illustration. No fewer than twenty contributors are answerable for its contents, and it is, of course, impossible to give a notice of each essay. Capt. R. W. Shufeldt records his "experiments in photography of live fishes," and nine plates attest the success of his efforts, which were made at the aquaria of the U.S. Fish Commission building in Washington. Prof. Mead is the writer of an elaborate paper on "The Natural History of the Star-fish." Among traditions attached to this animal was one relating to their mode of locomotion, as "that of clinging together in great clusters, and rolling along the bottom with the tide." Prof. Mead had seen balls of Star-fish clinging to each other, but upon examination it was found that the "Stars" were all endeavouring to devour some animal held in their midst. For the purpose of testing the ability of Star-fishes to creep over soft surfaces, vaseline was smeared thickly on a vertical glass plate, and on the under side of a horizontal glass plate, and these plates were submerged in an aquarium. Star-fishes measuring two or three inches from tip to tip were observed to travel over both these surfaces with no apparent difficulty. These experiments were made in an economic interest, and to solve the problem of how to prevent the invasion of these animals to the Oyster-beds; Collins, in 1888, having estimated the damage done by them to the beds in the Connecticut waters alone as amounting to

631,500 dollars, although 42,000 bushels of "Stars" were taken from the beds that year.

Mr. Hermon C. Bumpus has contributed an interesting report "On the Movements of certain Lobsters liberated at Wood's Hole during the summer of 1898." 479 Lobsters were tagged and liberated, and subsequently one was found to have made a record journey of twelve miles in three days. This, however, was in complete contrast to others, though we notice fifteen miles in six days, and the same distance in seven days, among other records. Of the whole number liberated, seventy-six very soon found their way to market, and there is considerable justification for the opinion, "that unless the supply of any one locality is replenished, either by immigration or artificial propagation, the Lobster will be exterminated; indeed, elimination has actually occurred at certain localities, and there is every indication that before long an industry which has yielded many millions of dollars will have perished through the inexcusable abuses of our fishing privileges."

U. S. Commission of Fish and Fisheries. Part xxvi. Report for the Year ending June 30th, 1900. Washington: Government Printing Office.

THIS volume, which has just reached our hands through the accredited channel, may be considered as a recent publication; the title-page is dated 1901. Its contents are a mass of valuable information more available for reference than review. From the report of the Commissioner, we learn that the failure of the "eastern Oyster" to reproduce in the colder waters of Oregon and Washington has suggested the desirability of transplanting to the west coast some of the fine large Oysters found in Northern Japan, notably in Akishi Bay, on the eastern side of Hokushu Island. This idea has passed the stage of suggestion, and negotiations are stated to have been undertaken for the shipment of a cargo.

Mr. H. F. Moore has contributed a report on the "Albatross South Sea Expedition." The full reports on this scientific expedition, under the direction of Mr. Alexander Agassiz, have yet to be published, but the present instalment is somewhat of

an itinerary of the voyage. Mr. Moore, as a naturalist, frequently narrates most interesting observations. Thus, at Tahiti, "a little Kingfisher is always found along the streams and their dry beds, apparently depending more upon insects, which it catches on the wing, than upon the usual food of its kind." At the village of Hihifa, on the island of Tongatabu, there is a remarkable rookery of Fruit-Bats, occupying about fifteen adjoining trees, and estimated to contain upwards of six thousand individuals. Although these animals destroy considerable quantities of fruit, they are "tapu," and under the immediate protection of the chief of Hihifa, and are not permitted to be shot or molested in any manner.

Mr. C. H. Townsend has supplied a "Chronological Bibliography relative to the Work of the Albatross," in which no fewer than some two hundred and forty-four memoirs are enumerated, relating wholly or in part to the results of this voyage; a long list is also given of papers still to be published on the same subject.

EDITORIAL GLEANINGS.

THE Bishop of Carpentaria has contributed to 'Nature Notes' some interesting narrative of a journey through Central Australia. We are told that "one of the great enemies of the overland telegraph line is the common Green Frog (probably *Hyla ewingii*). In order to save the insulators from being broken by the lightning, they are provided with wire 'droppers' leading round them at a little distance to conduct on to the iron pole in case of need. The Frogs climb the poles, and find the insulators cool and pleasant to their bodies, and fancy that the 'dropper' is put there to furnish them with a back seat. After a nap they yawn, and stretch out a leg until it touches the pole—result, sudden death of the Frog; and, as the body continues to conduct the current to earth, we have a paragraph in the papers to the effect 'that in consequence of an interruption to the lines, probably caused by a cyclonic disturbance in the interior, we are unable to present our readers with the usual cables from England'!"

At the Meeting of the Zoological Society, on March 18th, Dr. H. Gadow, F.R.S., F.Z.S., read a paper "On the Evolution of Horns and Antlers." He stated that three main types could be distinguished in the evolution of the ornamental weapons on the heads of Ruminants, and that all these types were referable to an ancient condition in which the beginning weapon, be it one of offence or defence, appeared as a mere exostosis with a thickened skin-pad. This stage resembled that of *Dinoceras* of the Eocene. Secondly, there was found exostosis of the frontal bone producing a pedicle, surmounted by a cartilaginous mass of apical growth, which by subsequent basal ossification became an antler. Skin originally unaltered and hairy; this, and the chondrostoma or cartilaginous later osseous growth, was shed periodically, and constituted the Cervine type.

A side issue of Type II. was that of pro-Giraffe-like animals. Cartilaginous growth preponderant, with multiple and broadened bases. Ossification delayed, but still proceeding from the base, e.g. the *Samotherium* of the topmost Miocene. A further development of this type (II.a) was shown by the Giraffe, in which the outgrowth pro-

liferated freely and now formed free growths, ossifying independently, of the cranial bones, but ultimately fusing with them.

Type III. was a continuation of the main line from II., represented by the Prongbuck; predominant epidermal growth produced a horn-shoe, which was periodically shed, but had abolished the shedding of the bony core which represented the antler.

Type IV., the highest stage, was represented by the hollow-horned Ruminants, in which the horn-shoe was now a permanent feature; but it was important to note that these animals still shed the first, or earliest, generation of the horny sheath. Horns and antlers were developed alike with a cartilaginous matrix, with subsequent ossification.

These four types were an illustration of onward phyletic evolution, and these stages were still faithfully repeated in the development of the recent species: this was a clear instance where ontogeny was a shortened recapitulation of phylogeny.

With most zoologists we neither affirm nor deny the possible existence of large sea-serpents at present unknown; on this question we are distinctly agnostic. From time to time we are treated in the newspapers with yarns, hasty and mistaken observations, and legends, anent this mythical animal. The following cutting from the 'Pall Mall Gazette' (Sept. 27th last) is worth reproduction for comparison with similar reports, and is given *sans* comment:—

"We have received the following letter from Mr. Oliver G. Ready, of the Chinese Customs. It has reference to a very old friend. Lappa, from which the letter comes, is close to the mouth of the Canton River:—

"Custom House, Lappa, August 22nd.

"SIR,—With the Commissioner's approval, I enclose copy of an official report made by Mr. Officer-in-Charge Wolfe on a monster sea-serpent seen by him when on patrol duty. Mr. Wolfe has been in the Chinese Imperial Maritime Customs service for nine years, and is now in charge of the armed revenue launch 'Lungtsing,' a vessel of one hundred tons and fourteen knots speed. He is most steady and trustworthy, and in every way to be believed. His testimony is, moreover, confirmed in writing by the second officer, and all of the 'Lungtsing's' Chinese crew who were on deck at the time. I have had a long conversation with Mr. Wolfe, and carefully sifted his evidence. You may rest assured that this is not a yarn, but a true and unvarnished account. Chuk Chao Islands are about twenty miles south-west of Hong-Kong, with ten to twelve fathoms of water. There had recently been very

heavy weather in the China Seas.—I am, Sir, yours faithfully, OLIVER G. READY.

"THE SEA-SERPENT.—On Sunday, Aug. 18th, 1901, at 11.20 a.m., as the Chinese Customs cruising launch 'Lungtsing' was steaming at half-speed heading for Boddam Cove, Tungho Island, in lat. N. 22 deg. 8 min. 30 sec. and long. E. 113 deg. 48 min. 40 sec., at about ten cables' length from the Chuk Chao Islands, I sighted a dark object on the surface of the water one point on the starboard bow, which looked to me like a rock. I at once gave the order 'full speed astern,' and vessel passed about thirty feet clear of the object, which, to my surprise, was a large serpent, lying in a round coil, with its head raised two or three feet, and slightly moving. Stopped engines and lowered starboard gig. I despatched Mr. Kuster, second officer, in gig with orders to kill the monster, if possible. Mr. Kuster stood in bow of gig with a boathook ready to strike. The serpent had now lowered its head again, but on approach of the gig suddenly struck out, hitting blade of one of the oars, turning the sailor turtle-back. It then raised its head to a level of launch's davit, about 15 ft., at a distance of not more than 10 ft. from the gig and 30 ft. from the launch where I stood. The crew of gig were scared, and prepared to jump overboard. Mr. Kuster, still standing in bow of the gig, prepared to strike with the boathook; but, before he could do so, the monster suddenly dived and made off. Its action in swimming was like that of an ordinary water-snake; the water being clear, the reptile could be plainly seen a few feet down. It dived very quickly, and made considerable disturbance of the water.

"We judged the serpent to be from 40 to 50 ft. long, and about a foot in diameter. It had a kind of crest on its head, and two fins high up on the neck, just behind the jaws. The thickest part of its body appeared to be about 15 ft. from the head, tapering both ways. Its head was as big as a Rugby football, with large eyes, and mouth opened wide when striking. It was of a very dark colour on the back—striped and mottled, but lighter on the belly.

"As soon as the serpent disappeared, and we on the launch had recovered from our first surprise, I ordered the ten-barrelled Nordenfelt to be loaded, and launch moved round slowly for fifteen or twenty minutes, in hopes that the reptile would reappear; but, not doing so, vessel proceeded on her way to Boddam Cove. (Signed) F. WOLFE, Officer in charge C.L. 'Lungtsing,' Aug. 21st, 1901. Witnesses: (Signed) V. KUSTER, Second Officer, and seventeen Chinese."

